

Montana Weather/Precipitation Summary

March 2016 NOAA's National Weather Service Great Falls Montana

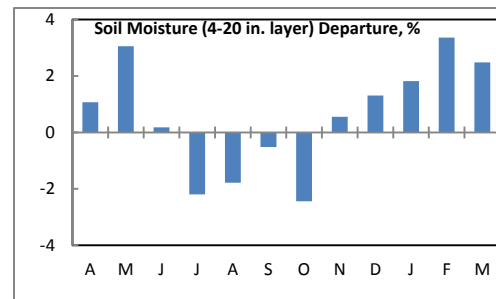
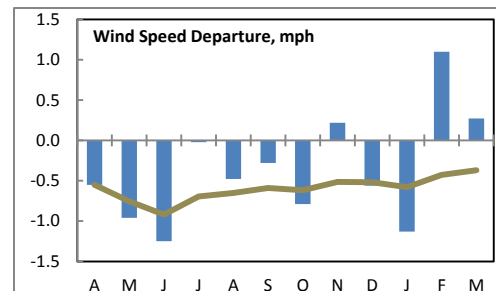
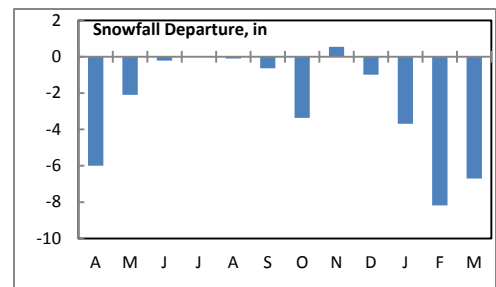
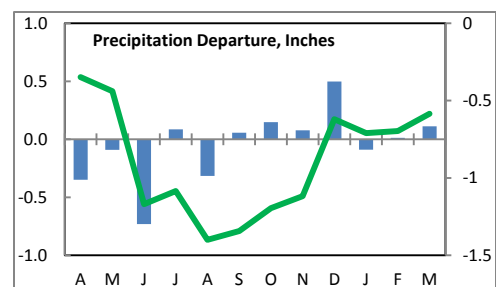
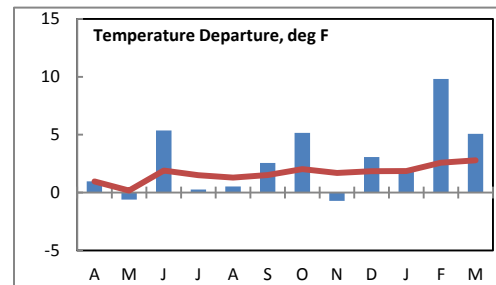
Although El Nino's influence gradually weakened in March, a weak upper level ridge remained along the North American west coast. This brought west to northwest warm and dry flow to the state. The ridge was close to normal for March (Fig. 1). Temperatures were near normal in the southwest valleys and above normal elsewhere. A Havre, a 55-day streak of above normal temperatures ended on the 17th, the second longest streak of record. Precipitation was variable with above normal west and south and below normal north central and eastern portions. March's winds were slightly above the long-term average.

Statewide composite temperatures averaged 5.1°F above normal for the month. The red line on the graph to the right shows the cumulative 12-month departure from normal. The temperature anomalies ranged from +0.9°F at Missoula to +9.0°F at Ridgeway (Fig. 2). The warmest average monthly temperature was 44.0°F at Yellowtail Dam, and the coolest was 22.1°F at West Yellowstone and Yellowmule (Gallatin). This was the 12th warmest March, and a little cooler than March 2015. For the past 12-months, the statewide composite average temperature is 2.8°F above normal. Ten of the last 12 months and 18 of the past 24 months have had warmer than normal temperatures.

The monthly departure from normal for precipitation across Montana is shown in Figure 3. Precipitation amounts were quite variable. Below normal precipitation was common across the north central through eastern portions, while areas of above normal precipitation were over the west and south central. The highest amount recorded was 11.10-inches at Poorman Creek SNOTEL (Lincoln). Noxon recorded 6.16-inches, while Many Glacier had 6.30-inches. Statewide, this month averaged 1.03", or 0.11" above normal. The statewide composite precipitation for the past 12 months is 0.58" below normal. The green line on the graph to the right shows the cumulative 12-month departure from normal. Six of the past 12 months have measured above normal precipitation.

The winter's trend of lighter than normal snowfall continued in March. The monthly composite was 4.2", or 6.7-inches below normal (figure on right). This was the 14th lightest March snowfall of record. March 2015's average was only 2.4-inches. Over the past 12-months, the snowfall composite is about one-half the normal amount. Only one of the past 12 have had above normal snowfall.

The statewide average winds were stronger than normal this month, ranking as the 25th windiest March of record. The statewide composite average was 9.7 mph, 0.3 mph above normal. The brown line of the graph to the right shows the 12-month cumulative statewide wind departure from normal. The 12-month average is running 0.4-mph below average. Only three of the past 12 have had above



normal average speeds. The fastest average speed was 15.6 mph at Livingston, with a higher elevation location, Deep Creek RAWS, recording 20.0 mph. The fastest measured gust of the month, 77-mph, occurred at Deep Creek on the 10th, while gusts reached 72 mph at Browning.

Composite statewide soil moisture is above normal for March. The average of 22.6-percent is 2.5 points above the 20 year average of 20.1-percent. This March had the 4th highest value of record.

Refer to NEIC's State of the Climate report for the latest monthly discussion:

<http://www.ncdc.noaa.gov/sotc/>.

March 1-15

Temperatures continued the above normal trend that began in late January. Along with the warm temperatures were generally dry conditions. A record high temperature was set at Glasgow on the 6th. Strong winds along the Rocky Mountain Front caused gusts of 77 mph at Deep Creek RAWS and 72 mph at Browning on the 10th, along with gusts to 66 mph at Livingston. Heavy rain fell west of the divide, with amounts near three-quarters of an inch in the Swan Range. Warmer air on the 12th brought record high temperatures to Havre and Lewistown.

March 16-31

Variable conditions prevailed during this period. A cool period from the 16th-19th brought the coolest air of the month to the state. Much of central Montana saw their coolest temperature in over two months, since January 17. Great Falls fell to 10°F on the 19th. On the 17th, the first measurable snow in 44 days fell at Great Falls. This is the longest such period during the winter since 1983. Rapid warming brought a record high temperature to Bozeman on the 21st. On the 23rd, a storm system brought the first significant precipitation of the month to southern Montana. Red Lodge picked up 13-inches of snow, while precipitation amounts near three-quarters of an inch fell at Livingston. Another late-month storm brought another 14-inches of snow to Red Lodge and Nye on the 24th. This system also affected the northern Rocky Mountain Front, with 10-inches falling at Many Glacier. Mystic Lake received 32-inches of snow during the last four days of the month.

Precipitation/convection

Severe convective weather occurred on zero days in March, which is normal.

Water Year

The temperature was 38.8°F or 4.0°F above normal. This was the warmest water year since 2000 and the 4th warmest of record.

The composite precipitation was 5.77-inches, 0.79" inches above normal. This is the 41st wettest water year to date, and the wettest since 2014.

Composite snowfall was 40.7" or 13.1" below normal. This is the lightest water year to date snowfall since 1988, and the 24th lightest of record.

Winds averaged 8.9 mph, the 17th calmest of record, and 0.2 mph below normal.

March summary information:

High Temperature	76°F at Forsyth, Hysham (5 th) & Terry (7 th)	Greatest Precip	6.30" at Many Glacier
Low Temperature	-20°F Whiskey Creek (19 th)		11.10" Poorman Creek SNOTEL
Warmest Ave Temp	44.0°F at Yellowtail Dam	Peak Wind Gust	77 mph at Deep Creek RAWS (10 th)
Coollest Ave Temp	22.1°F at Yellowmule and West Yellowstone		72 mph at Browning (10 th)
Range of Temp departures	+0.9°F at Missoula to +9.0° at Ridgeway	Highest Ave Wind	15.6 mph at Livingston 20.0 mph at Deep Creek RAWS
21 city mean monthly Temperature/Normal	38.3/33.2F 5.1F above normal. 12 th warmest of record (since 1880). 91 st percentile. Oct-Mar 32.8/28.8 4.0F above normal. 4 th warmest of record.	20 city mean monthly wind speed/Normal	9.7 mph/9.4 mph; 25 th windiest of record (since 1936). 45 th percentile. Oct-Mar 8.9 mph/9.1 0.2-mph below normal. 17 th calmest of record.
22 city mean monthly precipitation/Normal	1.03/0.92" – 111% of normal. 47 th wettest of record (since 1880). 65 th percentile. Oct-Mar 5.77"/4.98" – 0.79" above normal. 41 st wettest of record.		

**Historical Rank of Precipitation (inches)
for the Current Month and Water Year to Date**

Location	Mar	% of Norm	Rank	Pcntl	Oct 1 – Mar 31	% of norm	Rank	Pcntl	Years
Baker	0.24	39%			2.21	71%			18
Billings	1.15	103%	31	26	4.53	87%	45	39	115
Belgrade	0.96	102%	26	32	4.40	103%	31	38	79
Butte	0.45	59%	61	50	3.66	103%	53	43	122
Cut Bank	0.17	34%	49	44	2.57	135%	37	33	109
Dillon	0.51	94%	26	33	2.67	112%	20	25	76
Glasgow	0.53	126%	36	29	4.12	158%	19	16	117
Great Falls	0.50	55%	68	54	6.25	161%	10	7	124
Havre	0.40	74%	57	41	2.79	109%	79	58	136
Helena	0.19	32%	78	56	2.36	84%	101	74	137
Jordan	0.62	119%			5.57	217%			18
Kalispell	1.29	118%	25	20	7.64	103%	49	40	122
Lewistown	0.81	82%	50	41	4.39	98%	69	57	120
Livingston	1.10	131%	27	22	5.51	131%	20	17	113
Miles City	0.26	43%	82	59	2.33	85%	92	66	139
Missoula	0.86	90%	55	39	5.33	97%	79	58	136
Mullan Pass	7.92	177%			36.22	141%	6	7	75
Wolf Point	0.41	89%	8	41	2.64	106%			18
Glendive	0.15	25%	70	58	1.97	62%	82	69	118
Sidney	0.28	47%	24	30	2.04	58%	53	69	76
BZN-MSU	2.09	151%	18	12	7.93	116%	27	19	137

Rankings and Percentiles are 1=driest, higher numbers=wetter.

For an automated version of this chart, updated daily, go to

<http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS>

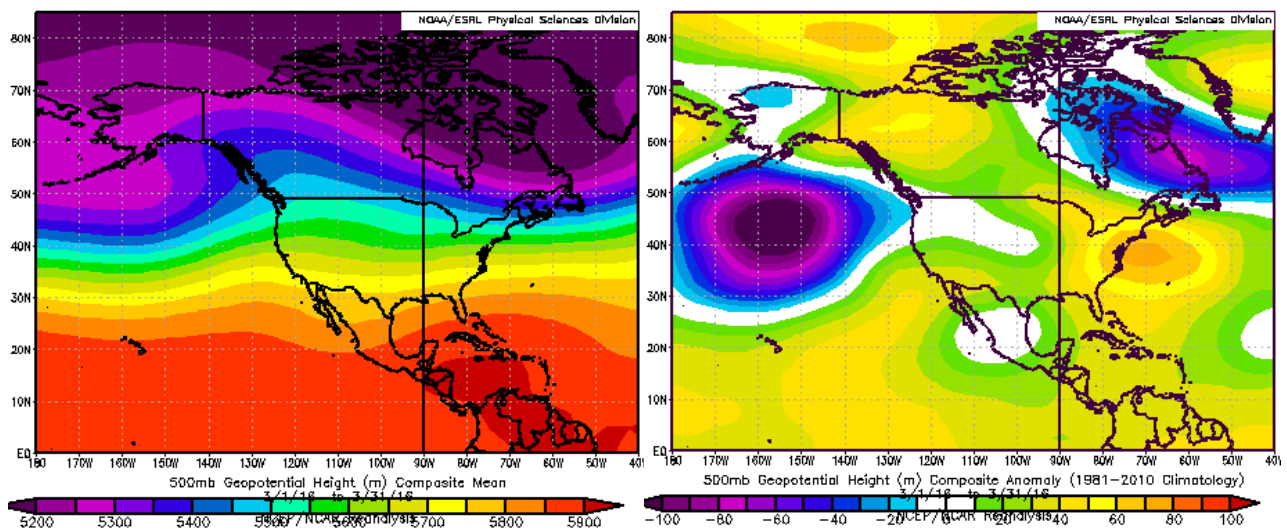


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (left) and departure from normal (right).

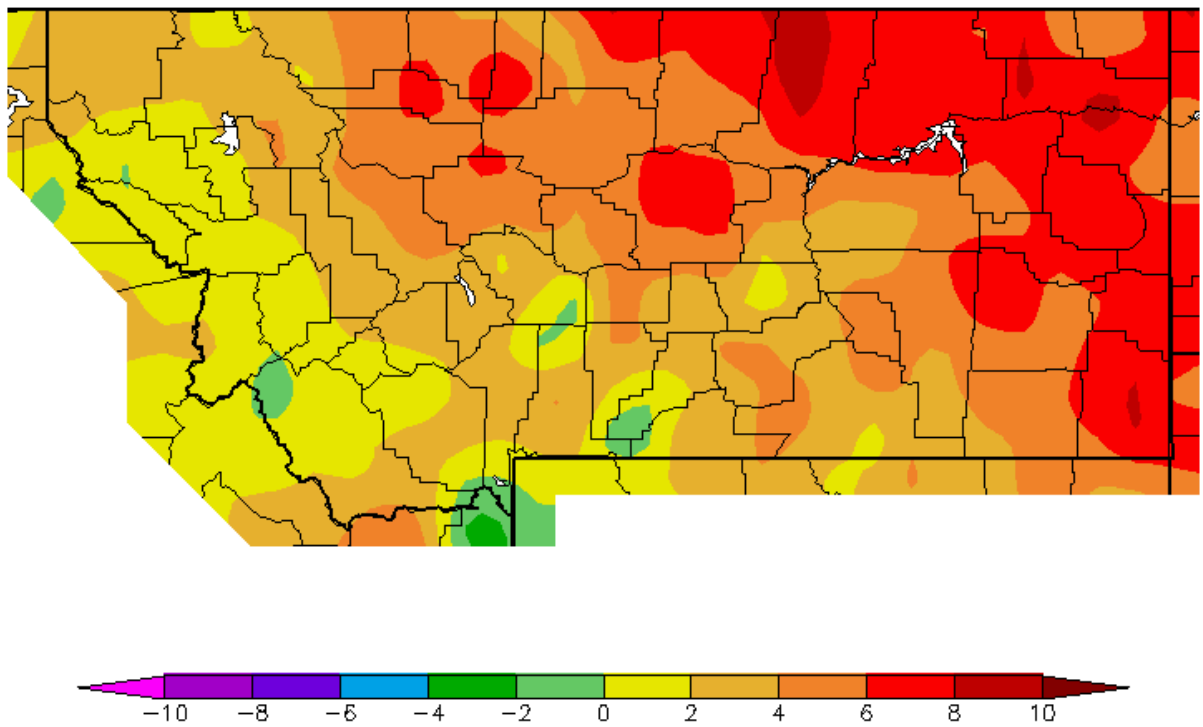


Figure 2. March 2016 temperature departures from normal (°F) (Western Region Climate Center).

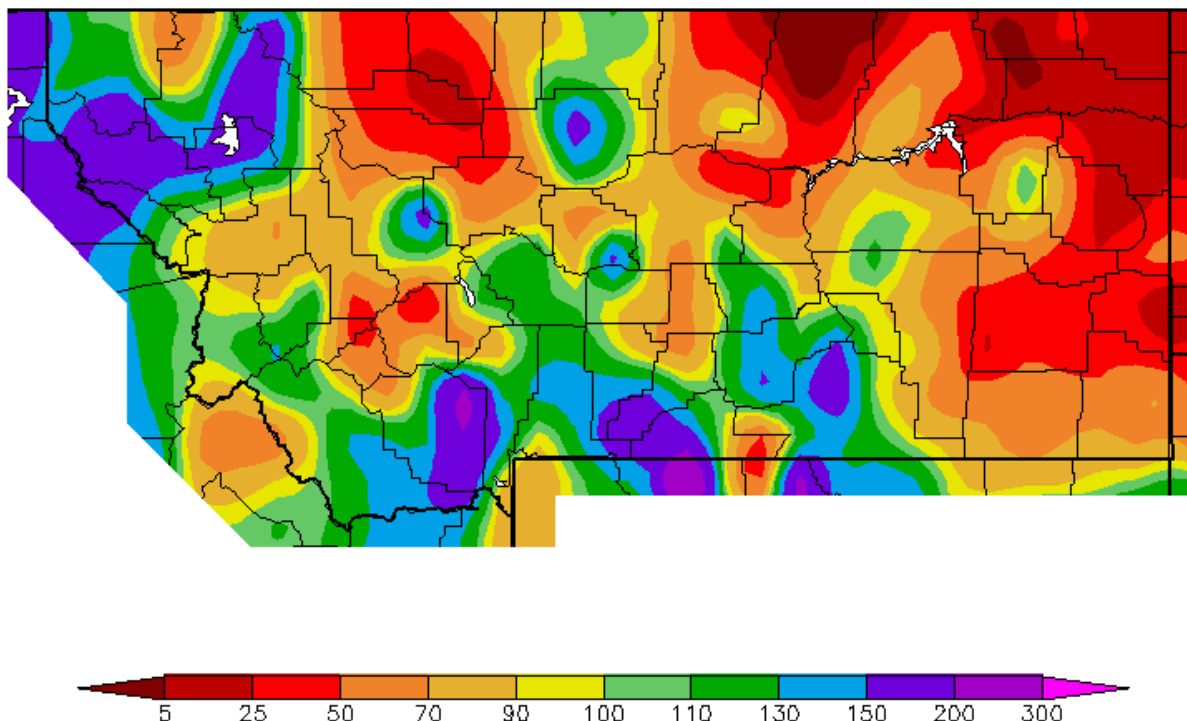


Figure 3. March 2016 precipitation departures from normal (percent) (Western Region Climate Center).

For a state map of % of normal water year precipitation (updated around the 7th of each month), go to:
<http://www.wrh.noaa.gov/tfx/climate/monthlysum/climatesum.php?wfo=tfx>

For the latest information on mountain snowpack from the NRCS, go to: <http://www3.wcc.nrcs.usda.gov/snow/index.html>

For the latest U.S. Drought Monitor, issued weekly by the National Drought Mitigation Center, USDA and NOAA, go to:
<http://droughtmonitor.unl.edu/>

These data are preliminary and have not undergone final QC by NEIC. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Environmental Information Center (NEIC) <http://www.ncdc.noaa.gov>. Many more links are on the Drought Information Page of the NWS Great Falls web site at <http://www.wrh.noaa.gov/tfx/main/drought.php?wfo=tfx>. The climatological record for normals is 1981-2010. The ranking period for temperature, precipitation and snowfall is since 1880. The ranking period for wind speeds is since 1936. The ranking period for soil moisture is since 1995.